REMARKS

Claims 1-72 are all the claims pending in the application. Claims 1-48 have been examined. New claims 49-72 are added via this amendment.

DISCLOSURE:

The specification is objected to because of various formalities. Applicants amend the specification to address the issues noted by the Examiner and to clarify the language. Withdrawal of this objection is requested.

37 C.F.R. § 1.74(a):

Claims 2, 4, 8, 12, 18, 20, 23-26, 28-30, and 34-48 are objected to under 37 C.F.R. 1.75(a) as being indefinite. Applicants amend the claims to clarify the language and not because of prior art. Withdrawal of this objection is requested.

35 U.S.C. § 102(a):

Claims 33, 35, 37, 41, 43 and 44 are rejected under 35 U.S.C. 102(a) as being anticipated by Okano et al. (WO 99/34982) [hereinafter "Okano"]). Applicants respectfully traverse this rejection in view of the following remarks.

The Examiner asserts that Okano teaches the claimed methods and apparatuses, including the desirability of spacing the ejection channels from 200 to 600 μm. For support of this assertion, the Examiner turns to the English equivalent of Okano (U.S. Patent No. 6,412,916) column 5, lines 39-65. This disclosure in Okano indicates that an electrode-to-electrode spacing is set to be about 200 to 600 μm. Applicants assert that this disclosure mentions "electrode-to-

electrode" spacing, but does not specifically describe a distance between ejection channels in combination with the other claimed features, for example, the recited "dpi."

Accordingly, Applicants submit that Okano fails to teach each feature recited in the claims. Withdrawal of this rejection is requested.

35 U.S.C. § 103:

- Claims 1-4, 7, 8, 17-20, 23, 24, 33-36, 39, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou[1] (JP 04-43,046 [hereinafter "Kondou"]) in view of Kato (JP 10-202,822 [hereinafter "Kato"]).
- Claims 5, 21, and 37 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Kojima et al. (JP 04-69,245).
- Claims 6, 22, 25, 26, 38, 41 and 42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Masaaki et at (JP 58-147,373).
- Claims 9-13, 27-31 and 43-47 are rejected tinder 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Arway et al. (US 4,555,712).
- Claim 14 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Ikkatai (US 5,363,132).
- Claims 15, 32 and 48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Totsugi (IP 02-95,862).

- Claim 16 is rejected under 35 U.S.C. 103(a) as being unpatentable over Kondou and Kato in view of Gasparrini (US 5,322,015).

The references of Kondou and Kato were applied against all of the independent claims 1, 3, 17, 19, 33 and 35. Kondou is relied on for an alleged teaching of the method except for printing with an electrostatic inkjet head. Kato is relied on for an alleged teaching of using an electrostatic inkjet head to make a lithographic printing plate. In regard to the claimed ejection channel distance, the Examiner makes the assertion that "the image resolution in Figure 2b [of Kondou] equates to an electrode spacing of 250 μm." However, Applicants respectfully submit that applied references fail to teach or suggest all the claimed features including the combination of the distance between ejection channels and the other claimed features, for example, the recited "dpi."

The remaining rejections under 35 U.S.C. § 103(a) address claims which depend from the independent claims. These claims are deemed to be patentable at least by their respective dependencies on the independent claims, due to the secondary references failing to make up for the deficient teachings of the primary references.

New Claims:

Applicants add new claims 49-72 to obtain more varied protection for the invention and submit that the unique features contained thereon are neither taught nor suggested by the applied art.

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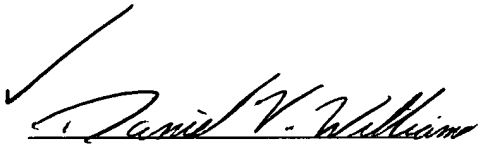
[1] Applicants point out that the publication number for this reference is 04-43036.

In view of the above, reconsideration and allowance of this application are now believed to be in order, and such actions are hereby solicited. If any points remain in issue which the Examiner feels may be best resolved through a personal or telephone interview, the Examiner is kindly requested to contact the undersigned at the telephone number listed below.

The USPTO is directed and authorized to charge all required fees, except for the Issue Fee and the Publication Fee, to Deposit Account No. 19-4880. Please also credit any overpayments to said Deposit Account.

Respectfully submitted,



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Date: July 7, 2003

APPENDIX
VERSION WITH MARKINGS TO SHOW CHANGES MADE

IN THE SPECIFICATION:

The specification is changed as follows:

Page 1, first full paragraph:

The present invention relates to an ink jet recording method which provides an image having a good quality using a multiple channel head recording device. The invention further relates to an lithographic printing method and apparatus which carries out digital-plate making on [an] a press using the ink jet recording method, a plate making method and apparatus which carries out the digital-plate making, and an ink jet printing method and apparatus.

Page 5, first full paragraph:

Further, Japanese Patent Unexamined Publication No. sho. 64-27953 discloses a plate-making method which comprises recording an image of [a] an oleophilic wax ink on a hydrophilic plate material by an ink jet process. In this method, since the image is formed of a wax, the resulting image area has a reduced mechanical strength and the adhesion of the image area to the hydrophilic surface of the plate material is insufficient, reducing the press life.

Page 24, the paragraph bridging pages 24 and 25:

The printing apparatus 1 also has an ink jet recording device (ink jet image depicting device) 2 which ejects an oil-based ink onto the plate material 9 mounted on the plate cylinder 11 in accordance with image data transmitted from an image [date] data calculation controlling unit 21, to thereby form an image on the plate material.

Page 27, first full paragraph:

The image [date] data calculation controlling unit 21 receives image data from, e.g., an image scanner, a magnetic disk device or an image data communication device, and not only carries out color separation but also processing of the separated data into appropriate numbers of pixels and gradations. In addition to these operations, the controlling unit 21 calculates dot position and dot area percentage in order to enable the recording of oil-based ink images in halftone dots by means of an ejection head 22 as recording head (see Fig. 2 explained in detail hereinafter) with which the ink jet recording device 2 is equipped.

Page 27, second paragraph:

Furthermore, as described below, the image [date] data calculation controlling unit 21 controls the movement of the ink jet ejection head 22 and the time at which the oil-based ink is ejected and, if desired, the timing of the rotation of the plate cylinder 11, the blanket cylinder 12, the impression cylinder 13, etc.

Page 28, first paragraph bridging pages 27 and 28:

The plate material 9 is first mounted on the plate cylinder 11 using the automatic plate material supplying device 7. The plate material is brought into close contact with and fixed firmly to the plate cylinder by means of a well-known mechanical device such as a plate top/tail gripping device or an air suction device, or by a well-known electrostatic device. Due to this firm fixation, the tail end of the plate material 9 is prevented from flapping against, and bringing into contact with and thus damaging the ink jet recording device 2 during the recording process. Also, it is possible to prevent the plate material 9 from [bring] being brought into contact with

the ink jet recording device by using an [arrange] arrangement which brings the plate material into close contact with the plate cylinder only in the neighborhood of the recording position of the ink jet recording device at least during recording the image. Specifically, the [arrange] arrangement may be, for example, hold-down rollers disposed on both upstream and downstream sides of the recording position of the plate cylinder. Further, an arrangement may be provided such that the end of the plate material is kept away from the ink supplying roller at fixing the plate material, making it possible to inhibit stain on the surface of the printing plate and hence reduce the number of sheets of waste paper. Specifically, hold-down rollers, guides, electrostatic attraction, etc. are effective.

Page 34, paragraph bridging pages 34 and 35:

The image [date] data calculation controlling unit 21, as described above, not only performs calculation operations on input image data and controls movement of the ejection head with the ejection head approaching and separating device 31 or the head subsidiary scanner 32 and rotation of the plate cylinder, but also receives a timing pulse from an encoder 30 attached to the plate cylinder and carries out operation of the ejection head in accordance with the timing pulse. As a result, positional precision in the direction of subsidiary scanning is improved. During the image recording by the ink jet recording device, the use of a driving unit having a high precision different from the driving unit for printing allows the plate cylinder to be driven in an enhanced positional precision in the direction of subsidiary scanning. During this procedure, the plate cylinder is preferably released mechanically from the blanket cylinder, the impression cylinder and others so that only the plate cylinder can be driven. More specifically, the output

from a high precision motor can be subjected to reduction through a high precision gear, steel band or the like to drive only the plate cylinder. During the recording of a high quality image, these devices may be used singly or in combination.

Page 42, paragraph covering pages 40 - 42:

The main body 41 of the head has a plurality of ink grooves 43 perpendicularly to the edge thereof for the purpose of ink circulation. The grooves 43 each may have any shape so far as the grooves can provide a suitable capillary action sufficient to form a uniform ink flow. However, it is especially desirable that the width of the groove is from 10 to 200 μm and the depth thereof is from 10 to 300 μm. Ejection electrodes 22b are provided in respective ones of the grooves 43. The ejection electrode 22b may be arranged so as to cover the entire surface of the ink groove 43 or it may be formed on only a portion of the groove using a conductive material such as aluminum, nickel, chromium, gold or platinum, according to a well-known method as described in the above-described example of the device. Additionally, the ejection electrodes are electrically isolated from one another. Two ink grooves adjacent to each other form one cell, and a separator wall 44 positioned in the center of the cell has an ejector 45 or 45' in the tip. The separator wall 44 is made thinner in the ejector 45 or 45' than in other portions thereof, and the ejector is sharpened. The main body of the head is formed by the configuration method such as mechanical processing or etching of a block of insulator material, or molding of an insulator material. It is desirable that the separator wall in the ejector has a thickness of from 5 to 100 μm and the sharpened tip thereof have a radius of curvature of from 5 to 50 μm. Further, the tip of the ejector may be slightly cut off as shown in the ejector 45'. In the figure,

only two cells are recorded for ease of illustration. A separator wall 46 is disposed between cells. The tip 47 of the wall 46 is cut off so as to be set back compared with the ejectors 45 and 45'. The ink is flowed into the ejection head via ink grooves from the direction indicated by an arrow I with from an ink supplying device (not shown), and thereby supplied to the ejectors. Further, the excess ink is recovered in the direction indicated by an arrow O with an ink recoverer (not shown). As a result, fresh ink is always supplied to each ejector. [Aplate] A plate cylinder holding a plate material on the surface thereof (not shown) is arranged so as to face the ejector. While maintaining such a condition, a voltage corresponding to the image information is applied to the ejection electrode, and ink is ejected from the ejector to form an image on the plate material.

Page 49, first full paragraph:

The embodiment of implication of the on-press recording type multi-color lithographic printing apparatus according to the present invention has been described with reference to an example of sheet-feed press. In the case where the present invention is implicated as an on-press recording type multi-color [WEB] web (paper roll) lithographic printing machine, on the other hand, the foregoing unit type or common impression cylinder type printing machine can be used to advantage. In the case where the present invention is implicated as an on-press recording type multi-color [WEB] web double-sided printing machine, both the unit type and common impression cylinder type printing machine can be realized by arranging a plurality of structures each having a known [WEB] web inverting device provided in at least one gap between adjacent impression cylinders such that printing is effected on both surfaces of printing paper P. Most

preferred among on-press recording type multi-color [WEB] web double-sided printing apparatus is BB (blanket-to-blanket) type printing machine. This type of printing machine comprises one plate cylinder and blanket cylinder (no impression cylinder) for one color to be printed on one surface of [WEB] web and one plate cylinder and blanket cylinder (no impression cylinder) for the same color to be printed on the other surface of [WEB] web, said blanket cylinders being pressed against each other during printing. This structure is provided in an amount corresponding to the number of colors to be printed. [WEB] Web passes through the gap between the blanket cylinders which are pressed against each other during printing to perform multi-color double-sided printing.

Page 53, paragraph bridging pages 53 and 54:

The plate material 9 is first mounted on the drum 11 by using the automatic plate material supplying device 7. At this time, the plate material 9 is brought into close contact with and fixed on the drum 11 by a well-known mechanical method such as a plate top/tail gripping device, an air suction device, etc., or [an] a well-known electrostatic method, etc. Therefore, the tail end of the plate material 9 is prevented from flapping against, [andbringing] and bringing into contact with and thus damaging the ink jet recording device 2 during the process of recording the image thereon. Also, it is possible to prevent the plate material 9 from [bring] being brought into contact with the ink jet recording device 2 by using an [arrange] arrangement which brings the plate material 9 into close contact with the drum 11 only in the neighborhood of the recording position of the ink jet recording device 2 at least during recording the image. In detail, for

example, the [arrange] arrangement may be hold-down rollers disposed on both upstream and downstream sides of the recording position on the drum 11. When not recording an image, it is preferable that the head is kept apart from the plate materials, whereby it is possible to effectively prevent the plate materials from being brought into contact with the ink jet recording device 2 and being thereby damaged.

Page 54, first full paragraph:

The image data calculation controlling unit 21 receives image data from an image scanner, [an] a magnetic disk unit, an image data transmission device, etc., decomposes the colors as necessary, and simultaneously calculates to divide the decomposed image into an adequate number of pixels and graduations. Further, it calculates the dot area percentage in order to dot an oil-based ink image or to make the same into half tone by using an ink jet ejection head 22 (See Fig. 3, described in detail later) that the ink jet recording device 2 has. In addition, as described later, the image data calculation controlling unit 21 controls movement of the ink jet ejection head 22 and ejection timing of oil-based ink, and simultaneously, controls the operation timing of the drum 11, etc., as necessary.

Page 66, first full paragraph:

An ink jet printing apparatus (hereinafter called a "printing apparatus") shown in Fig. 14 is composed of a supplying roll 101 of a roll-shaped printing medium, a dust and paper dust removing device 102, [an] a recording device 103, an opposed (image-recording) drum disposed at a position opposed to the recording device 103 and a printing medium, a fixing device 105 and a printing medium winding roll 106.

Page 81, first full paragraph:

Preferred examples of the nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less include straight-chain or branched aliphatic hydrocarbons, alicyclic hydrocarbons, aromatic hydrocarbons and halogenated products of these hydrocarbons. Specific examples thereof include hexane, heptane, octane, isooctane, decane, isodecane, decaline, nonane, dodecane, isododecane, cyclohexane, cyclooctane, cyclodecane, benzene, toluene, xylene, mesitylene, Isopar C, Isopar E, Isopar G, Isopar H and Isopar L (ISOPAR: tradename, a product of Exxon Corp.), Shellsol 70 and Shellsol 71 (SHELLSOL: tradename, product of Shell Oil Corp.), Amsco OMS and Amsco 460 Solvent (AMSCO: tradename, product of American Mineral Spirits Corp.), and silicone oils. They can be used singly or as a mixture of two or more thereof. As to the nonaqueous solvent, the upper limit of the inherent electrical resistance value is of the order of 10^{16} Ω-cm, and the lower limit of the dielectric constant value is about 1.9.

Page 98, paragraph bridging pages 97 and 98:

A circulation pump was used as a stirring means, and a multi-channel head of 256 channels, which is a 100dpi as has been typed in Fig. 5, Fig. 7 or Fig. 9, is disposed. A pump is used, an ink reservoir is, respectively, provided at an ink flow course between the pump and the ejection head, and between the ink recovery course of the ejection head and the ink tank. Then, ink is circulated by a difference in the static pressure between these courses. A heater and the above-described pump are used as a means for controlling an ink temperature, wherein the ink temperature is set to 35°C and is controlled by a thermostat. Herein, the circulation pump was

also used as an stirring means for preventing precipitation and aggregation. In addition, a conductivity measuring device is disposed in the ink flow course, wherein the concentration of ink is controlled by diluting the ink or concentrating the same on the basis of the signals outputted from the conductivity measuring device. As a plate material, the above-described aluminum plate was mounted on the plate cylinder of [an] a lithographic printing apparatus. After dust on the surface of the plate material is removed by a nylon-made rotary brush, data of an image to be printed are transmitted to the image data calculation controlling unit, and the image is recorded by a full-line head while rotating the plate cylinder. Oil-based ink is ejected onto the aluminum plate to form the image. Any defective image due to dust cannot be found, and the image can be prevented from deteriorating due to changes in the dot diameters even by changes of the outer temperature and/or an increase in the number of plates made, wherein satisfactory plate making can be achieved. Subsequently, the image is fixed by a heated roller (made by HITACHI KINZOKU, and its consumption power is 1.2kw), is strengthened, and is made into a printing plate.

Page 99, first full paragraph:

A 50 (dpi) 128-channel multiple channel head as shown in Fig. 7 was mounted as an ejection head on the ink jet recording device of an on-press recording type four-color [sigle] single-sided lithographic printing apparatus (see Fig. 10). Using a contact roller made of [Teflon] TEFLON, the gap was adjusted to 0.8mm. 5,000 sheets of printing plates were then prepared in the same manner as in Example 1 except that the ink tank was replenished with a concentrated ink according to the number of sheets having the ink concentration control means.

As a result, the image thus formed on the plate material showed no defects due to dust and was not affected by the change of the ambient temperature. As the number of sheets of printing plates made increased, the diameter of dots printed showed some but an acceptable change. The printing plates thus made were also subjected to flash fixing as mentioned above and fixing by irradiation with light from a halogen lamp (Type QIR, produced by USHIO INC.), or [fixing] fixed with a spray of ethyl acetate.

IN THE CLAIMS:

The claims are amended as follows:

1. (Amended) An on-press recording type lithographic printing method comprising mounting a plate material on a plate cylinder of a press, ejecting an oil-based ink onto the plate material from a recording head having a plurality of ejection channels utilizing an electrostatic field according to signals of image data to directly form an image on the surface of the plate material and prepare a printing plate, and then effecting the lithographic printing using the printing plate as it is,

wherein the distance [of] between the ejection channels is 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

2. (Amended) The on-press recording type lithographic printing method according to Claim 1, wherein said oil-based ink is a dispersion comprising resin particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

3. (Amended) An on-press recording type lithographic printing apparatus comprising an image forming means for directly forming an image onto a plate material mounted on a plate cylinder of a press by using an ink jet recording device which ejects an oil-based ink from a recording head having a plurality of ejection channels according to signals of image data utilizing an electrostatic field, a lithographic printing means for effecting a lithographic printing using a printing plate formed by said image forming means,

wherein image forming means includes the recording head having the distance [of] between the ejection channels being 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

4. (Amended) The on-press recording type lithographic printing apparatus according to Claim 3, wherein said oil-based ink is a dispersion comprising resin particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

8. (Amended) The on-press recording type lithographic printing apparatus according to Claim 7, wherein said ink jet recording device carries out subscanning by the recording head by approaching and separating from said plate cylinder in an axial direction [of said plate cylinder] when [recoding] recording an image on said plate material.

12. (Twice Amended) The on-press recording type lithographic printing apparatus according to Claim 3, further comprising ink temperature controlling means for controlling the temperature of the ink in [the] an ink tank housing the oil-based ink.

17. (Amended) A plate making method comprising directly forming an image on a plate material and preparing a printing plate by recording using an ink jet method which ejects an oil-based ink from a recording head having a plurality of ejection channels according to signals of image data utilizing an electrostatic field, a lithographic printing means for effecting a lithographic printing using a printing plate formed by [said] image forming means,

wherein the formation of the image onto the plate material is carried out by the recording head having the distance [of] between the ejection channels being 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

18. (Amended) The plate making method according to Claim 17, wherein said oil-based ink is a dispersion comprising resin particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

19. (Amended) A plate making apparatus comprising image forming means for directly forming an image on a plate material by an ink jet recording device which ejects an oil-based ink

from a recording head having a plurality of ejection channels according to signals of image data utilizing an electrostatic field,

wherein the formation of the image onto the plate material is carried out by the recording head having the distance [of] between the ejection channels being 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

20. (Amended) The plate making apparatus according to Claim 19, wherein said oil-based ink is a dispersion comprising resin particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

23. (Twice Amended) The plate making apparatus according to Claim 19, wherein the image is recorded by causing a printing medium to move by rotating [the] a drum having the plate material mounted thereon when recording an image on the plate material.

24. (Amended) The plate making apparatus according to Claim 23, wherein the image is recorded by also causing the recording head to move in an axial direction of said drum.

25. (Twice Amended) The plate making apparatus according to Claim 19, wherein when recording the image on the plate material, subscanning is carried out by causing said plate material to move [with the same] by being pinched by at least a pair of capstan rollers.

28. (Amended) The plate making apparatus according to Claim 27, further comprising ink recovering means for recovering the oil-based ink from the recording head, where [the] ink circulation is carried out.

29. (Twice Amended) The plate making apparatus according to Claim 19, wherein the ink jet recording device includes ink stirring means for stirring the oil-based ink in [the] an ink tank housing the oil-based ink.

30. (Twice Amended) The plate making apparatus according to Claim 19, wherein the ink jet recording device includes ink temperature controlling means for controlling the temperature of the oil-based ink in [the] an ink tank housing the oil-based ink.

33. (Amended) A printing method comprising directly forming an image onto a printing medium and producing a print by an ink jet method which ejects an oil-based ink from a recording head having a plurality of ejection channels according to signals of image data utilizing an electrostatic field,

wherein the formation of the image onto the printing medium is carried out by the recording head having [the distance the image forming means includes the recording head having] the distance [of] between the ejection channels being 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

34. (Amended) The ink jet printing method according to Claim 33, wherein said oil-based ink is a dispersion comprising color particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

35. (Amended) A printing apparatus comprising image forming means for directly forming an image onto a printing [material] medium by an ink jet recording device which ejects an oil-based ink from a recording head having a plurality of ejection channels according to signals of image data utilizing an electrostatic field,

wherein the formation of the image onto the printing medium is carried out by the recording head having [the distance the] an image forming means [includes the recording head having], where the distance [of] between the ejection channels being 170 μm or more {150 dpi (150 dots per inch) or less as calculated in terms of resolution of recorded image}.

36. (Amended) The printing apparatus according to Claim 35, wherein said oil-based ink is a dispersion comprising color particles which are solid and hydrophobic at least at [ordinary] one temperature dispersed in a nonaqueous solvent having an inherent electrical resistance of 10^9 Ω-cm or more and a dielectric constant of 3.5 or less.

41. (Twice Amended) The printing apparatus according to Claim 35, wherein when recording onto the printing medium, the image is recorded by causing said printing medium to move [with the same] by being pinched by at least a pair of capstan rollers.

45. (Twice Amended) The printing apparatus according to Claim 35, wherein the ink jet recording device includes ink stirring means for stirring the oil-based ink in [the] an ink tank housing the oil-based ink.

46. (Twice Amended) The printing apparatus according to Claim 35, wherein the ink jet recording device includes ink temperature controlling means for controlling the temperature of the oil-based ink in [the] an ink tank housing the oil-based ink.

New claims 49-72 are added.